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EXHAUST EMISSIONS FROM A PASSENGER CAR WITH GASOLINE TREATED WITH BYCOSIN FUEL ADDITIVE

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16. Abstracts

The effects of the additive Bycosin were evaluated using a 1962 Chevrolet Impala. This vehicle was equipped with a 283 cu. in. V-8 engine and automatic transmission. The following tests were performed on the vehicle: (1) standard 1970 Federal Test Procedure for exhaust emissions; (2) closed, constant volume sampling technique using 9 repeats of the 7-mode, 1970 Federal emissions test cycle; (3) standard 1972 Federal Test Procedure using the LA4-S3 driving cycle with constant volume sampling; (4) steady state test procedure, using the continuous sampling technique. The following conclusions were drawn from the tabulated data: the data from tests utilizing a cyclic driving pattern differed considerably from that of a steady state operation. The steady state operation showed a significant increase while the exact opposite was found when the cyclic driving patterns were driven. These data proved to be inconclusive in that no consistent repeatable data was obtained.

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Air pollution
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Tests
Standards
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Nitrogen oxides
Carbon monoxide
Hydrocarbons

17b. Identifiers/Open-Ended Terms

Bycosin Fuel Additive
Federal Test Procedure (1970)
Constant Volume Sampling Technique (CVS)
LA4-S3 driving schedule
Steady State Test Procedure

17c. COSATI Field/Group 13B

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Vehicle Tested

In order to evaluate the effects of the additive Bycosin a 1962 Chevrolet Impala was selected. There is extensive data on this vehicle and it has a record of good repeatability. This vehicle is equipped with a 283 cubic inch V8 engine and automatic transmission. The additive was mixed with Indolene 30 fuel as specified by the manufacturer.

Tests Conducted

The following four tests were performed on the vehicle:

1. Standard 1970 Federal test procedure for exhaust emissions (Table 1).
2. Closed, constant volume sampling technique using nine repeats of the 7-mode 1970 Federal emissions test cycle (Table 2).
3. Standard 1972 Federal test procedure using the LA-4-S3 driving cycle with constant volume sampling (Table 3).
4. Steady State Test procedure, using the continuous sampling technique (Table 4).

For the 1970 Federal test procedure, oxides of nitrogen were analyzed using a continuous non-dispersive infrared technique. For the constant volume sampling tests oxides of nitrogen were measured using both the wet chemical modified Saltzman technique and the electrochemical "NO_x Box". Carbon monoxide was measured using non-dispersive infrared and hydrocarbons were determined using a flame ionization detector.

Emission Results

In Table 1 comparisons are made between two identical tests using the 1970 Federal test procedure. Minor increases were noted in hydrocarbons and carbon monoxide emissions but oxides of nitrogen showed a minor decrease in emissions.

Table 2 constant volume tests shows the same type of emission results.

The 1972 Federal test procedure reported in Table 3 shows a specific improvement in hydrocarbons, carbon monoxide and oxides of nitrogen.

During steady state conditions shown in Table 4 hydrocarbons and carbon monoxide data consistently showed a significant reduction, oxides of nitrogen increased considerably at all speeds. A 1963 Chevrolet Impala with automatic transmission was used for this test only.

Conclusions

Data from tests utilizing a cyclic driving pattern differed considerably from that of steady state operation. The steady state operation showed a significant increase, the exact opposite was found when the cyclic driving patterns were driven.

These data proved to be inconclusive in that no consistant repeatable data was obtained.

To be able to obtain consistent data complex programs have to be developed to provide a confidence factor in any improvements found. Unless extensive testing is accomplished it is impossible to say conclusively what the effects of Bycosin would be on emissions for the total car population. The results of this test do not justify such a program by this Agency.

TABLE 1

1970 Federal Test Procedure

	HC gpm	CO gpm	NO_x gpm
Baseline (Indolene 30)	7.25	71.66	4.14
Bycosin (Indolene 30 plus additive)	7.79	72.20	3.62
Percent Reduction from Baseline	-6.93% (Increase)	-0.88% (Increase)	12.6%

TABLE 2

9 Cycle Constant Volume Sampling

	HC gpm	CO gpm	NO_x gpm
Baseline (Indolene 30)	10.58	89.31	4.35
Bycosin (Indolene 30 plus additive)	10.92	92.98	4.26
Percent Reduction from Baseline	-3.11% (Increase)	-3.94% (Increase)	2.06%

TABLE 3

1972 Federal Test Procedure

	HC gpm	CO gpm	NO_x gpm
Baseline (Indolene 30)	9.5	112.3	4.15
Bycosin (Indolene 30 plus additive)	8.33	101.19	3.81
Percent Reduction from Baseline	12.32%	9.89%	8.19%

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gpm indicates calculated mass in grams per mile

TABLE 4

Steady State

State		Baseline		Additive		% Reduction
10 MPH	HC	254.1	314.6	230.3	260.9	13.6%
	CO	2.2	2.3	1.3	1.4	39.6%
	NO	118.1	104.4	158.1	136.2	-24.4%
20 MPH	HC	276.7	299.9	254.1	270.0	9.1%
	CO	1.9	1.7	1.2	1.1	36.0%
	NO	242.1	206.6	327.2	265.7	-22.9%
30 MPH	HC	354.5	382.9	327.9	368.2	5.6%
	CO	2.0	2.21	1.4	1.6	28.6%
	NO	517.6	381.5	612.9	619.7	-27.0%
40 MPH	HC	411.5	376.6	391.9	388.2	1.0%
	CO	4.1	3.1	3.8	2.6	11.1%
	NO	601.8	724.2	665.2	924.2	-16.6%
50 MPH	HC	370.7	371.3	356.4	354.5	4.2%
	CO	4.1	4.2	3.6	3.4	16.6%
	NO	846.9	829.3	985.5	1003.3	-15.7%

HC and NO given in ppm (parts per million)
CO given in %